

CLAIMS

What is claimed is:

1 1. A semiconductor structure comprising a copper
2 member located within a semiconductor device; a germanium-
3 containing layer of at least one member selected from the
4 group consisting of copper germanide, germanium oxide,
5 germanium nitride and combinations thereof, located on at
6 least one surface of the copper member; and a layer of a
7 material poorly adherent to copper located on the germanium-
8 containing layer.

1 2. The semiconductor structure of claim 1 wherein the
2 copper member is copper or a copper alloy.

1 3. The semiconductor structure of claim 1 wherein the
2 germanium-containing layer comprises copper germanide.

1 4. The semiconductor structure of claim 1 wherein the
2 germanium-containing layer comprises germanium oxide.

1 5. The semiconductor structure of claim 1 wherein the
2 germanium-containing layer comprises germanium nitride.

1 6. The semiconductor structure of claim 1 wherein the
2 germanium-containing layer comprises a layer of copper
3 germanide and a layer of germanium oxide.

1 7. The semiconductor structure of claim 1 wherein the
2 germanium-containing layer contains a layer of copper
3 germanide and a layer of germanium nitride.

1 8. The semiconductor structure of claim 1 wherein the
2 germanium-containing layer contains a layer of copper
3 germanide, a layer of germanium oxide and a layer of
4 germanium nitride.

1 9. The semiconductor structure of claim 1 wherein the
2 germanium-containing layer has a thickness of about 100 to
3 about 1000 Å.

1 10. The semiconductor structure of claim 1 wherein the
2 germanium-containing layer has a thickness of about 150 to
3 about 400 Å.

1 11. The semiconductor structure of claim 9 wherein the
2 copper has thickness of about 1000 to about 20,000 Å.

1 12. The semiconductor structure of claim 9 wherein the
2 layer of material poorly adherent to copper has a thickness
3 of about 100 to about 20000 Å.

1 13. The semiconductor structure of claim 1 wherein the
2 material poorly adherent to copper is silicon nitride.

1 14. The semiconductor structure of claim 1 wherein the
2 material poorly adherent to copper is silicon dioxide.

1 15. A process for fabricating a semiconductor
2 structure which comprises the steps of providing a
3 germanium-containing layer of at least one member selected
4 from the group consisting of copper germanide, germanium
5 oxide, germanium nitride and combinations thereof onto at
6 least one surface of a copper member; and providing a layer

7 of a material that does not adhere well to copper on the
8 germanium-containing layer.

1 16. The process of claim 15 which comprises providing
2 a germanium-containing layer by selectively forming copper
3 germanide on the copper member by flowing germane over the
4 structure.

1 17. The process of claim 16 wherein the germane is at
2 a temperature of about 200 to about 450°C.

1 18. The process of claim 16 which comprises providing
2 a gaseous composition containing about 0.05 to about 5% of
3 germane and a second gas selected from the group consisting
4 of nitrogen, helium, argon, and mixtures thereof.

1 19. The process of claim 15 wherein the germanium-
2 containing layer is provided by providing a layer of copper
3 germanide on the copper and then oxidizing all or a portion
4 of the copper germanide to provide a layer of germanium
5 oxide.

1 20. The process of claim 15 wherein the thickness of
2 the germanium-containing layer is about 100 to about 1000 Å.

1 21. The process of claim 15 wherein the thickness of
2 the germanium-containing layer is about 150 to about 400 Å.

1 22. The process of claim 19 wherein the layer of
2 copper germanide is about 100 to about 1000 Å and the layer
3 of germanium oxide is about 100 to about 1000 Å.

1 23. The process of claim 15 wherein the germanium-
2 containing layer comprises providing a layer of copper
3 germanide and then nitriding all or a portion of the copper
4 germanide layer to provide germanium nitride.

1 24. The process of claim 23 wherein the copper
2 germanide layer is about 100 to about 1000 Å thick and the
3 germanium nitride layer is about 100 to about 1000 Å thick.

1 25. The process of claim 15 wherein the germanium-
2 containing layer is provided by providing a layer of copper
3 germanide on the copper, then oxidizing all or a portion of
4 the copper germanide to provide a layer of germanium oxide,
5 and then nitriding a portion of the copper oxide layer to
6 provide germanium nitride.

26. The process of claim 15 wherein the copper member
is copper or a copper alloy.

27. The process of claim 15 wherein the copper member
is about 1000 to about 20,000 Å thick.

2 28. The process of claim 15 wherein the layer of
silicon nitride is about 100 to about 20000 Å thick.

1 29. The process of claim 15 wherein the material that
2 does not adhere well to copper is silicon nitride.

1 30. The process of claim 15 wherein the material that
2 does not adhere well to copper is silicon dioxide.

1 31. A semiconductor structure obtained by the process
2 of claim 15.